

Date: \_\_\_\_\_

Title: 7.4 Solving Polynomial Equations

IN:

Solve using factoring and the zero-product property.

a.)  $x^2 - 5x - 14 = 0$       b.)  $x^2 - 121 = 0$

Jan 6-7:42 PM

Use **factoring** to solve  $2x^3 - 7x^2 + 3x = 0$ 

$$2x^3 - 7x^2 + 3x = 0$$

Check the graph:

click to remove

Feb 19-12:23 PM

Use a **graph**, synthetic division, and **factoring** to find all of the roots of  $x^3 - 7x^2 + 15x - 9 = 0$ .

$$x^3 - 7x^2 + 15x - 9 = 0$$

1. Use a graph to approximate roots

click to remove

2. Use synthetic division to test your choices.

click to check answer

3. Since the remainder is 0,  $x^3 - 7x^2 + 15x - 9 = 0$   
 $x - 1$  is a factor of  $(x - 1)(x^2 - 6x + 9) = 0$  Finish by factoring  
 $x^3 - 7x^2 + 15x - 9 = 0$

Feb 19-12:23 PM

Use **variable substitution** and **factoring** to find all of the roots of  $x^4 - 4x^2 + 3 = 0$ .

1.  $x^4 - 4x^2 + 3 = 0$

$$(x^2)^2 - 4(x^2) + 3 = 0$$

$$u^2 - 4u + 3 = 0$$

make it a simpler problem by substituting  $u$  for  $x^2$ .Factor and solve for  $u$ .

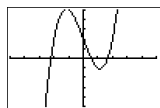
2. Replace  $u$  with  $x^2$ , and solve for  $x$ .

$$x^2 = \quad \quad x^2 = \quad$$

3. Check using the graph.

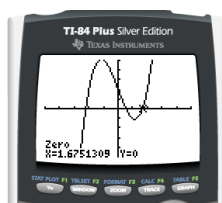
click to check graph

Feb 19-12:58 PM

**Location Principle**Graph the function:  $P(x) = x^3 - 4x + 2$ 

Use 2nd CALC to estimate the Zeros

2nd TRACE 2



$$x \approx 1.675$$

Feb 19-1:40 PM

**Application Problem****Why?**

Using polynomial equations, you can solve real world problems such as finding the radius needed for the base of a silo in order to have a desired volume.

**Volume of a cylinder**

$$C(r) = \pi r^2 h$$

**Volume of a half the dome top**

$$H(r) = \left(\frac{1}{2}\right)\left(\frac{4}{3}\pi r^3\right)$$

$$= \frac{2}{3}\pi r^3$$

**The total volume of the silo is**

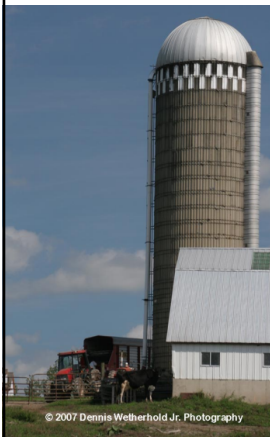
$$T(r) = H(r) + C(r)$$

$$= \frac{2}{3}\pi r^3 + \pi r^2 h$$



Feb 19-1:40 PM

So...what if a farmer wants to design a silo whose cylindrical part has a height of 20 feet. Approximately what radius of the cylinder and hemispherical top will give a total volume of 1830 cubic feet?



The total volume of the silo is

$$T(r) = \frac{2}{3}\pi r^3 + \pi r^2 h$$

Substitute 1830 for volume and 20 for height

click to check

Solve for  $r$  by graphing the related function and approximating the real zeros.

WINDOW  
Xmin=-40  
Xmax=20  
Xscl=5  
Ymin=-5000  
Ymax=7000  
Yscl=100  
Yres=1

click to  
check  
graph

Feb 25-8:55 AM

I Use Factoring to solve the equation

$$x^3 - 11x^2 + 10x = 0$$

- A 0, -1, -10  
B 0, 1, 10  
C 0, -1, 10  
D 0, 1, -10

Feb 25-8:03 AM

2 Use Factoring to solve the equation

$$2x^3 - 2x^2 - 24x = 0$$

- A 0, 3, 4  
B 0, 3, -4  
C 0, -3, 4  
D 0, -3, -4

Feb 25-8:06 AM

3 Use a graph, synthetic division, and factoring to find all roots of the equation.

$$x^3 + 4x^2 + x = 6$$

- A 1, 2, 3  
B -1, -2, -3  
C -1, -2, 3  
D 1, -2, -3

Feb 25-8:06 AM

4 Use a graph, synthetic division, and factoring to find all roots of the equation.

$$x^3 - 11x^2 + 24x + 36 = 0$$

The factors are: \_\_\_\_\_

- A  $(x+1)(x+6)(x+6)$   
B  $(x+1)(x-6)(x-6)$   
C  $(x-1)(x-6)(x-6)$   
D  $(x-1)(x+6)(x+6)$

So, the roots are: \_\_\_\_\_

Feb 25-8:06 AM

5 Use variable substitution and factoring to find all roots of the equation.

$$x^4 - 10x^2 + 21 = 0$$

- A 3 and 7  
B -3 and -7  
C  $\sqrt{3}$  and  $\sqrt{7}$   
D  $\pm\sqrt{3}$  and  $\pm\sqrt{7}$

Feb 25-8:06 AM

6

Use variable substitution and factoring  
to find all roots of the equation.

$$x^4 - 17x^2 + 16 = 0$$

- A  $\pm 1$  and  $\pm 4$
- B -1 and 4
- C -1 and -16
- D 1 and 16

Feb 25-8:06 AM

### Summary

#### ROOTS AND ZEROS

The real number  $r$  is a zero of  $f(x)$  if and only if all of the following are true.

- $r$  is a solution, or root, of  $f(x)=0$ .
- $x-r$  is a factor of the expression that defines  $f$  (that is,  $f(r) = 0$ ).
- When the expression that defines  $f$  is divided by  $x-r$ , the remainder is 0.
- $r$  is an  $x$ -intercept of the graph of  $f$ .

Feb 19-1:18 PM

### OUT:

**pg. 452**  
**#5**

### Summary:

The easiest part of today was...  
or  
I liked...

#### Homework

7.4 HW P.453 #10, 12-57 (by 3's), 64

Dec 24-3:57 PM